

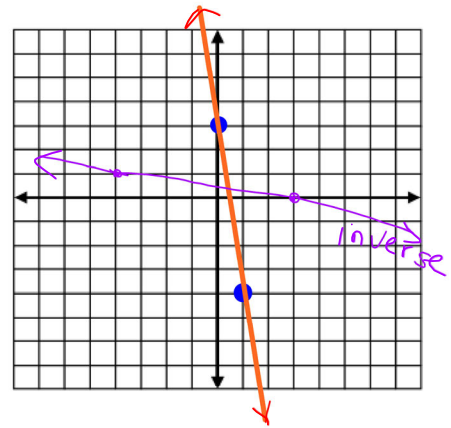
Inverse Functions
Notes

Name _____

1. Given the function: $y = 3 - 7x$

a. Graph this function (on warm-up)

x	y
-2	17
-1	10
0	3
1	-4
2	-11



switch x & y
on points

17	-2
10	-1
3	0
-4	1
-11	2

b. Find the inverse of this function

switch x & y
solve for y

$$x = 3 - 7y$$

$$x - 3 = -7y$$

$$y = \frac{-1}{7}x + \frac{3}{7}$$

c. Graph the inverse.

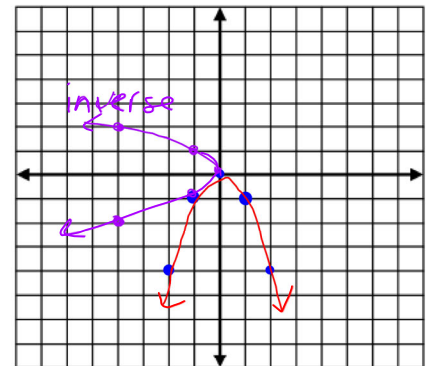
2. Given the function: $f(x) = -x^2$

$y = -x^2$

a. Graph this function (on warm-up)

original

x	y
-2	-4
-1	-1
0	0
1	-1
2	-4



b. Find the inverse of this function

switch x & y

$$x = -y^2$$

$$-x = y^2$$

$$y = \pm\sqrt{-x}$$

inverse

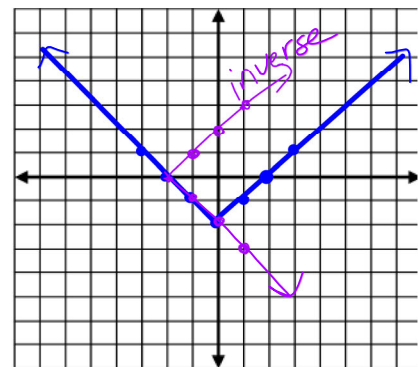
-4	-2
-1	-1
0	0
-1	1
-4	2

c. Graph the inverse.

3. Given the function: $f(x) = |x| - 2$

a. Graph this function (on warm-up)

x	y
-3	1
-2	0
-1	-1
0	-2
1	-1
2	0
3	1



b. Graph the inverse.

switch x & y values

1	-3
0	-2
-1	-1
-2	0
-1	1
0	2
1	3

We have seen that if you reverse the x and y coordinates of all the points of a function, and graph the result, you get the inverse function. This same logic works in the algebraic sense.

Finding Inverse Functions

Examples:

1. If $f(x) = x - 5$, find $f^{-1}(x)$

$$\begin{aligned}y &= x - 5 \\x &= y - 5 \\x + 5 &= y \\x + 5 &= f^{-1}(x)\end{aligned}$$

$$f^{-1}(x) = x + 5$$

find the inverse

Steps to write the inverse:

- #1 Pretend $f(x)$ is a y
- #2 Switch the x and y
- #3 Solve for y
- #4 Stop pretending

2. If $g(x) = 2x - 7$, find $g^{-1}(x)$ find & inverse

$$y = 2x - 7$$

$$+7 \quad x = 2y - 7 \quad +7$$

$$\frac{x+7}{2} = \frac{2y}{2}$$

$$\frac{x+7}{2} = y$$

or

$$\frac{1}{2}x + \frac{7}{2} = y$$

$g^{-1}(x) = \frac{1}{2}x + \frac{7}{2}$

Stop pretending

3. If $h(x) = x^2 - 5$, find $h^{-1}(x)$ ^{inverse}

$$y = x^2 - 5$$
$$x = y^2 - 5 \quad \text{switch } x \rightarrow y$$
$$+5 \quad +5 \quad \text{solve for } y$$
$$x + 5 = y^2$$

$$\pm\sqrt{x+5} = y$$

$$\pm\sqrt{x+5} = h^{-1}(x)$$

Or

$$h^{-1}(x) = \pm\sqrt{x+5}$$

4. If $f(x) = \sqrt{x-5}$, find $f^{-1}(x)$

$$y = \sqrt{x-5}$$

$$x = \sqrt{y-5}$$

$$x^2 = y - 5$$

$$x^2 + 5 = y$$

$$f^{-1}(x) = x^2 + 5$$